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ABSTRACT

This guide is designed to aid instructional personnel in all areas of vocational education in the articulation of secondary and postsecondary programs through verification of student competencies. It presents general information on what program articulation is and why it is important, how articulation may be achieved in the least constraining fashion, what circumstances will permit automatic advanced placement, and what circumstances require testing. Three major sections describe these tools of articulation: student performance records, structured interview, and domain referenced testing. The first describes the Student Performance Record, a listing of tasks taught on secondary and postsecondary levels, and Task Detailing, a supporting document showing in detail what is taught in each task. Maintaining and supplementing the record are also discussed. A second section defines a structured interview and suggests how to develop one. The third section on domain referenced testing addresses background and significance of domain referenced testing, developing a domain referenced test, and developing a test item. The final section focuses on evaluation devices for performance testing. (YLB)

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STUDENT ASSESSMENT SYSTEM

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Georgia Department of Education

Atlanta, Georgia 30334

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Vocational Education Materials Center

Division Of Vocational Education

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The University Of Georgia

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COMPETENCY VERIFICATION GUIDE

DEVELOPED BY

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December, 1980



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POLICIES AND PROCEDURES FOR THE CENTER

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2. Conduct and report curriculum research related to Vocational Education.
3. Provide a production and dissemination center for Vocational Education materials.
4. Provide direct experiences in curriculum development and diffusion for advanced graduate students.
5. Enable faculty members to participate in the development and implementation of a variety of curriculum materials.

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Preface

Since the emergence of the comprehensive high schools in the 1960's vocational educators in Georgia have been concerned with the creation of a system that would enable secondary students to continue the development of their specialized skills in post secondary schools. This continuation should occur in a fashion that would allow advanced credit for work already completed and accelerate the acquisition of the additional skills necessary to advance in the work place.

For this articulation process to succeed, three sub-processes must be in operation. The first of these is the willingness of instructors and administrators to accomplish the goals of articulation. A comprehensive articulated curriculum is the second required sub-process, and a functional means of student transfer from one institution to another is the third.

The climate has long been favorable to articulation. Instructors and administrators have worked independently and with the Georgia Department of Education to implement the concepts of articulation in local school settings. In spite of these efforts the success rate has been modest. This general lack of accomplishment is explained by the lack of a comprehensive curriculum and the vehicles for student transfer, particularly assessment instruments and techniques.

Through the Curriculum Articulation Project (CAP) advisory committee a master plan for developing the necessary means was prepared. This plan provided for identifying task linkage as a basis for curriculum development and the creation of a project to design student assessment and transfer procedures. The student transfer and assessment techniques that are contained in this document and the companion volumes are the results of the CAP committee request for a student assessment project. The materials and

techniques described here should facilitate the implementation of articulated vocational education programs for those clusters of schools actively seeking such an arrangement. But more than that, individual students will no longer be subjected to the monotonous routine of repeating the same courses they mastered as high school students.

Paul Scott

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PURPOSE OF THE GUIDE

Introduction

This Competency Verification Guide has been designed for use by instructional personnel in all areas of vocational education to aid in the articulation of secondary and post secondary programs. One of the objectives of the articulation effort, of which this Guide is a part, is to improve the utilization of educational resources, significantly reduce the duplication of effort, and improve the mobility of students, within and between educational levels.

It is anticipated that, when students become aware that they can obtain advanced placement in the post secondary vocational program based upon the skills obtained in high school, enrollment in these programs will increase. No longer will a student be required to start at the beginning of a program regardless of what skills are already possessed.

This guide presents general information on what program articulation is and why it is important, how articulation may be achieved in the least constraining fashion, what circumstances will permit automatic advanced placement, and what circumstances require testing. Also included is information concerning the tools of articulation. The tools described and demonstrated will be a student performance record, the structured interview, domain interview, domain referenced testing, and comprehensive testing.

The Guide describes how to use the various components of the Student Assessment System. Readers will be shown how to fill out the records, how to work out problems which may arise, who should be responsible for the record and how it should be used. It will also address the "how to" aspects of Domain Referenced Testing such as how to set up for a DRT, how to choose

a test item, how to determine what to test, how to set up a test pool, and how to use additional rating devices, checklists and observational devices. As an aid to the testing aspect of the Guide, a background for Domain Referenced Testing is provided along with a detailed explanation of how to develop similar tests.

The Need for a Competency Verification Guide

When the employers of Georgia hire a person (who has attended one of the state occupational programs), that person is expected to be competent in the area in which he or she will work. Also, when a post secondary school gives advanced standing to an entering student, the student is expected to be competent in the areas for which he or she is receiving credit. The question then raised is, "how can the competency of these individuals be established?"

Georgia is only one of many states striving to articulate secondary and post secondary vocational schools through a competency based approach. Ron Brandt, Associate Superintendent for Instruction in Lincoln, Nebraska, made the following preface remarks in Competencies for Articulation, a publication of the Lincoln Public School System.

More emphasis than ever is being given to educational competencies. The public is questioning the basic abilities of graduates and is demanding that schools be more accountable for student performance. Educators are determined to give a clear definition of what students are expected to learn.

He further states:

Although many people are interested in competencies, few seem able to explain what they mean or give specific examples.

In Georgia, as in Nebraska, the word competency, while being well accepted, is difficult to define. The University of Georgia Student Assessment Project team met with many of the personnel of the post secondary vocational schools and their secondary "feeder" schools during the

development of this guide. These persons exhibited a positive attitude toward articulation and a competency based approach to it. Although each school and school system had a slightly different concept of a competency, most agreed that a competency is knowing about and being able to perform an activity which is based on a group or cluster of tasks. For example, in automotive mechanics, a competency dealing with the area of heating and cooling systems might be stated as follows: The ability to diagnose present and potential problems in the heating and cooling systems of liquid cooled engines, and to test, remove, repair and/or replace the faulty components so that the heating and cooling system meets manufacturer's specifications.

To further illustrate the above stated competency, the tasks which are included in the competency are listed:

- *Check coolant freezing point.

- *Check coolant temperature.

- *Check overflow tank.

Chemically clean and flush cooling system.

- *Inspect, adjust, or replace fan belts.

Perform chemical test on cooling systems.

- *Pressure test cooling system.

- *Remove and replace radiators.

Replace core plugs (freeze plugs).

Replace heater hoses.

- *Replace radiator hoses.

- *Replace variable speed fan.

- *Replace water pump.

Solder minor leaks in radiators.

- *Test and replace thermostat

- *Diagnose heating system malfunctions.

Replace defroster hose.

Replace heater control units.

Remove and replace heater core.

Repair heater core.

Service heater control components.

*Denotes task taught in most secondary transportation cluster programs.

The reader should note that not all of the tasks listed above are taught in all high schools. This fact emphasizes the need for a systematic procedure designed to determine the tasks within a competency in which a student is proficient. In addition to identifying individual tasks, the system must also be able to identify the specific competency in which the student is proficient.

Educators have for years given achievement tests, I.Q. tests, aptitude tests, and all manner of other tests to students; however, these tests are not satisfactory for the purpose of assessing vocational skills for articulation. This Competency Verification Guide deals with this problem in two different ways. The first is through a Student Performance Record and the second is with Domain Referenced Tests. Although the inner workings of both of these assessment instruments will be explained in later sections, a brief description is in order to illustrate the handling of competency verification.

The Student Performance Record is a coded list of tasks divided into duty areas (or performance groups, or whatever is appropriate for the occupation) and major blocks. This record provides the instructor with a method of keeping an accurate record of the tasks that have been mastered by a student. When the student transfers to a post secondary school, the Student Performance Record serves a function similar to that of a transcript and informs the post secondary instructor where the student is in the quest for mastery of a competency area.

The Domain Referenced Tests (DRTs) have been designed for use with students who do not have a Student Performance Record or whose records are unacceptable for various reasons. The DRTs also represent the complete task listing of an occupation and can be used to pinpoint where a student is relative to the mastery of a particular competency area.

STUDENT PERFORMANCE RECORD

Introduction

An accurate record keeping system is paramount if the Student Assessment System is to be successful. The record keeping must be initiated with the high school vocational teacher and should follow the student's career through both the secondary school and the post secondary school. The Student Performance Record is based upon a task continuum; therefore, it is essential for a curricular relationship (articulation) to exist between secondary and post secondary programs.

Post secondary vocational educators must be able to interpret the record of competencies when it is submitted by the secondary school. For this reason a standardized Student Performance Record is necessary. In an ideal situation, this record will list the tasks taught on both the secondary and the post secondary levels. In the sample record presented as Figure 1, the tasks EL-01 through EL-19 are taught on the secondary level, and EL-20 through EL-33 are taught on the post secondary level. These tasks are coded to correspond with the curriculum task/unit numbers.

Unfortunately, it will not always be feasible to list both secondary and post secondary tasks on a Student Performance Record. An example of such a case is the record presented in Figure 2, which lists only those tasks taught in the secondary transportation cluster. Therefore, in this case, a matrix which links the post secondary tasks to the secondary tasks is used to identify related tasks. (See the example in Figure 3).

To interpret the Student Performance Record, a supporting document is necessary. This document can easily show in detail what is taught in each task (or unit). Figure 4 is an example of the type of information the supporting document should contain. It should list in detail the main

GEORGIA VOCATIONAL EDUCATION

STUDENT PERFORMANCE RECORD

ELECTRO-MECHANICAL/REFRIGERATION/HEATING and AIR CONDITIONING

Student Name _____ Social Security Number _____

Schools _____ Dates _____ Instructor(s) _____

Rating	Level of Performance
1	Degree of skill below minimum performance level
2	Acceptable level of skill; can perform with supervision and/or assistance
3	High level of skill; can perform independently and consistently at a high level

The rating on this competency record gives the entry level vocational skills this student has demonstrated based on set standards or criteria. This record is intended for use in assessing the student's ability for employment or advanced educational purposes. An item left unmarked indicates the student has not received instruction.

The first blank indicates the secondary rating - the second blank is the post secondary rating.

MAJOR BLOCK -- Electricity (EL)

PERFORMANCE GROUP -- Fundamentals

EL-01	EL-02	EL-03
EL-04	EL-05	EL-06
EL-07	EL-08	EL-09
EL-10	EL-11	

PERFORMANCE GROUP -- Electric Motors

EL-12	EL-13	EL-14
EL-15	EL-16	EL-17
EL-18	EL-19	EL-20

PERFORMANCE GROUP -- Electrical Components

EL-21	EL-22	EL-23
EL-24	EL-25	EL-26
EL-27		

PERFORMANCE GROUP -- Controls and Installation

EL-28	EL-29	EL-30
EL-31	EL-32	EL-33

MAJOR BLOCK -- Refrigeration (REF)

PERFORMANCE GROUP -- Refrigeration Fundamentals

REF-01	REF-02	REF-03
REF-04	REF-05	REF-06
REF-07		

PERFORMANCE GROUP -- Tubing and Pipe

REF-08	REF-09	REF-10
--------	--------	--------

PERFORMANCE GROUP -- Refrigerants

REF-11	REF-12	REF-13
REF-14	REF-15	REF-16
REF-17	REF-18	

PERFORMANCE GROUP -- Troubleshooting

REF-19	REF-20	REF-21
REF-22	REF-23	REF-24
REF-25		

PERFORMANCE GROUP -- Window Air Conditioning

REF-26 (AC-06)	REF-27 (AC-07)
REF-28 (AC-08)	REF-29 (AC-09)
REF-30 (AC-10)	REF-31 (AC-11)
REF-32 (AC-12)	

PERFORMANCE GROUP -- Refrigerators and Freezers

REF-33	REF-34	REF-35
REF-36	REF-37	REF-38

MAJOR BLOCK -- Residential Wiring (REW)

PERFORMANCE GROUP -- Grounded Outlets

REW-01	REW-02	REW-03
REW-04	REW-05	REW-06
REW-07		

PERFORMANCE GROUP -- Service Entrance

REW-08	REW-09	REW-10
--------	--------	--------

PERFORMANCE GROUP -- Blueprint Reading

REW-11	REW-12	REW-16
REW-14		

MAJOR BLOCK -- Major Appliance (MA)

PERFORMANCE GROUP -- Installation of Appliances

MA-01	MA-02	MA-03
MA-04	MA-05	MA-06
MA-07	MA-08	MA-09

Figure 1

learning concepts upon which the unit or task is based. A recommended title for the document is Student Performance Record, Task Detailing.

An alternative to the above process is to develop a performance record which contains enough information to adequately inform the reader of the student's skills. This practice, in some instances, may be the most

GEORGIA VOCATIONAL EDUCATION STUDENT PERFORMANCE RECORD TRANSPORTATION/AUTOMOTIVE MECHANICS					
Student Name _____	Social Security Number _____				
Schools _____	Dates _____	Instructor(s) _____			
_____	_____	_____			
_____	_____	_____			
<table style="width: 100%; border: none;"> <tr> <td style="width: 15%; vertical-align: top;"> Rating 1 2 3 </td> <td style="width: 40%; vertical-align: top;"> Level of Performance Degree of skill below minimum performance level Acceptable level of skill; can perform with supervision and/or assistance High level of skill; can perform independently and consistently at a high level </td> <td style="width: 45%; vertical-align: top;"> The rating on this competency record gives the entry level vocational skills this student has demonstrated based on a set standards or criteria. This record is intended for use in assessing the student's ability for employment or advanced educational purposes. An item left unmarked indicates the student has not received instruction. The first blank indicates the secondary rating, the second blank is the post-secondary rating. </td> </tr> </table>			Rating 1 2 3	Level of Performance Degree of skill below minimum performance level Acceptable level of skill; can perform with supervision and/or assistance High level of skill; can perform independently and consistently at a high level	The rating on this competency record gives the entry level vocational skills this student has demonstrated based on a set standards or criteria. This record is intended for use in assessing the student's ability for employment or advanced educational purposes. An item left unmarked indicates the student has not received instruction. The first blank indicates the secondary rating, the second blank is the post-secondary rating.
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<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> MAJOR BLOCK -- Automotive Service PERFORMANCE GROUP -- Handtools HT-1 _____ HT-2 _____ HT-3 _____ HT-4 _____ HT-5 _____ HT-6 _____ PERFORMANCE GROUP -- Chassis Lubrication CL-1 _____ CL-2 _____ CL-3 _____ CL-4 _____ CL-5 _____ CL-6 _____ CL-7 _____ PERFORMANCE GROUP -- Servicing Coding Systems SCS-1 _____ SCS-2 _____ SCS-3 _____ SCS-4 _____ SCS-5 _____ SCS-6 _____ SCS-7 _____ SCS-8 _____ PERFORMANCE GROUP -- Servicing Suspension Systems SSS-1 _____ SSS-2 _____ SSS-3 _____ SSS-4 _____ SSS-5 _____ SSS-6 _____ SSS-7 _____ SSS-8 _____ </td> <td style="width: 50%; vertical-align: top;"> MAJOR BLOCK -- Brakes PERFORMANCE GROUP -- Hydraulic Brakes HB-1 _____ HB-2 _____ HB-3 _____ HB-4 _____ HB-5 _____ HB-6 _____ HB-7 _____ HB-8 _____ HB-9 _____ HB-10 _____ HB-11 _____ MAJOR BLOCK -- Engine Overhaul PERFORMANCE GROUP -- Valve Grinding and Adjusting VGA-1 _____ VGA-2 _____ VGA-3 _____ VGA-4 _____ VGA-5 _____ VGA-6 _____ VGA-7 _____ VGA-8 _____ VGA-9 _____ VGA-10 _____ VGA-11 _____ VGA-12 _____ </td> </tr> </table>			MAJOR BLOCK -- Automotive Service PERFORMANCE GROUP -- Handtools HT-1 _____ HT-2 _____ HT-3 _____ HT-4 _____ HT-5 _____ HT-6 _____ PERFORMANCE GROUP -- Chassis Lubrication CL-1 _____ CL-2 _____ CL-3 _____ CL-4 _____ CL-5 _____ CL-6 _____ CL-7 _____ PERFORMANCE GROUP -- Servicing Coding Systems SCS-1 _____ SCS-2 _____ SCS-3 _____ SCS-4 _____ SCS-5 _____ SCS-6 _____ SCS-7 _____ SCS-8 _____ PERFORMANCE GROUP -- Servicing Suspension Systems SSS-1 _____ SSS-2 _____ SSS-3 _____ SSS-4 _____ SSS-5 _____ SSS-6 _____ SSS-7 _____ SSS-8 _____	MAJOR BLOCK -- Brakes PERFORMANCE GROUP -- Hydraulic Brakes HB-1 _____ HB-2 _____ HB-3 _____ HB-4 _____ HB-5 _____ HB-6 _____ HB-7 _____ HB-8 _____ HB-9 _____ HB-10 _____ HB-11 _____ MAJOR BLOCK -- Engine Overhaul PERFORMANCE GROUP -- Valve Grinding and Adjusting VGA-1 _____ VGA-2 _____ VGA-3 _____ VGA-4 _____ VGA-5 _____ VGA-6 _____ VGA-7 _____ VGA-8 _____ VGA-9 _____ VGA-10 _____ VGA-11 _____ VGA-12 _____	
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Figure 2

Post Secondary		Secondary		Service station mechanic 620-261-10	Auto mechanic 620-261-10	Brake mechanic 620-261-026	Carburetor mechanic 620-261-034	Front end mechanic 620-261-036	Transmission mechanic 620-261-062	Auto mechanic helper 620-684-014	Tune-up mechanic 620-261-060
<u>Cooling and Lubrication (212)</u>		<u>Servicing Cooling Systems (SCS)</u>									
212-1	Servicing Cooling System	SCS-1	Check Anti-Freeze and Pressure Test Cooling System								
		SCS-2	Flush and Winterize Cooling System								
		SCS-3	Replace Radiator and Heater Hose	X	X						X
		SCS-4	Remove and Replace Radiator	X	X						
		SCS-5	Replace Thermostat and Bypass Line								
		SCS-6	Replace and Adjust Drive Belts	X	X						X
		SCS-7	Replace Water Pump and Check Fan Clutch	X	X						X
		SCS-8	Check Temperature Gauge, Remove and Replace Block Unit	X	X						
		<u>Chassis Lubrication (CL)</u>									
212-2	Servicing Engine Lubrication System	CL-1	Using the Twin Post Hoist								
212-3	Lubricating Chassis	CL-2	Change Oil and Oil Filter								
		CL-3	Lubricate Chassis	X	X						X
212-4	Replacing and/or Repacking Wheel Bearings	CL-4	Lubricate Body Friction Points								
		CL-5	Change Automatic Transmission Fluid	X	X				X	X	
		CL-6	To Pack Front Wheel Bearings (With Drum Type Brakes)	X	X	X					X
		CL-7	Pack Front Wheel Bearings (With Disc Brakes)								
<u>Basic Fuel Systems (213)</u>		<u>Fuel Systems (FS)</u>									
213-1	Cleaning or Repairing Fuel Tanks and Lines	FS-1	Cleaning and Repairing Fuel System Components		X		X				
213-2	Testing and/or Replacing Fuel Pump	FS-2	Testing and Replacing the Fuel Pump	X	X		X			X	
213-3	Overhaul a Single Barrel Rochester Carburetor	FS-3	Overhauling a Single Barrel Carburetor								
213-4	Overhauling a Single Barrel Ford Carburetor	FS-4	Adjusting an Overhauled Carburetor	X			X				
213-5	Overhauling a Two-Barrel Rochester Carburetor	FS-5	Overhauling a Two-Barrel Carburetor								
213-6	Overhauling Chrysler Product Two-Barrel Carburetor										
213-7	Overhauling Two-Barrel Ford Carburetor										
213-8	Troubleshooting Fuel System Problems				X		X				
213-9	Servicing Exhaust System	FS-6	Repairing the Exhaust System	X	X						
213-10	Servicing Carburetor Air Cleaner			X	X	X	X	X	X		
<u>Charging Systems (221)</u>		<u>Testing Charging System (TCS)</u>									
221-1	Testing a D-C Charging System	TCS-1	Polarizing and Troubleshooting a D-C Generator	X	X						X
221-2	Overhauling a D-C Generator	TCS-2	Replacing and Adjusting Drive Belts	X	X						X
221-3	Turning Armature and Undercutting Mica				X						
221-4	Benchtesting on D-C Generator				X						X
221-5	Testing, Setting and/or Replacing a D-C Regulator			X	X						X
221-6	Testing an A-C Charging System (Conventional Type)	TCS-3	Inspecting and Testing an Alternator System								
		TCS-4	Performing Current Output and Circuit Resistant Test	X	X						
221-7	Overhauling an A-C Charging System (Conventional Type) GM	TCS-5	Removing and Disassembling the Alternator								
		TCS-6	Bench Testing the Alternator								
		TCS-7	Disassembling the Alternator								
		TCS-8	Performing Rotor Tests and Stator Tests on an Alternator		X						X
221-8	Overhauling a Ford Motor Type A-C Generator (Conventional Type)	TCS-9	Testing Diodes								
		TCS-10	Assembling and Installing an Alternator								
221-9	Overhauling A-C Generator	TCS-11	Testing an A-C Regulator		X						
		TCS-12	Adjusting an A-C Regulator		X					X	X
221-10	Adjusting an A- Regulator (Conventional Type)	TCS-13	Replacing an A-C Regulator		X					X	X
221-11	Testing Indicator Lamp and Ammeter										

Figure 3. Post Secondary/Secondary Task Matrix

TASK LIST

MAJOR BLOCK: AUTOMOTIVE SERVICE

PERFORMANCE GROUP: SERVICING COOLING SYSTEMS

SCS-1 Check Anti-Freeze and Pressure Test Cooling System

Objective: Given an automobile and the necessary tools and equipment, determine the cooling system condition and antifreeze content, and recommend the needed cooling system service if needed.

- A. Radiator types and construction
- B. Heat transfer methods
- C. Types of coolants and additives
- D. Thermostat and pressure caps
- E. Types of cooling fans
- F. Water pump operation
- G. Safety precautions
- H. Troubleshooting procedures
- I. Servicing cooling system
- J. Cleaning and storing equipment

SCS-2 Servicing the Cooling System

Objective: Given proper manufacturer's manual(s), the necessary tools and equipment, service and winterize the cooling system on a designated vehicle. The engine must operate at the normal temperature and the cooling system must not leak.

- A. Manufacturer's Manuals
- B. Radiator types and construction
- C. Heat transfer methods
- D. Types of coolants and additives
- E. Thermostats and pressure caps
- F. Types of cooling fans
- G. Water pump operation
- H. Safety precautions
- I. Troubleshooting procedures
- J. Servicing cooling system
- K. Cleaning and storing equipment

Figure 4. Task Detailing

practical approach. However, most vocational programs do not lend themselves to this approach without expanding the record to a multiple page document which would be very bulky in a permanent record keeping system.

Maintaining the Record

The instructions for making notations on the student's permanent record of skill accomplishment are quite simple. Information called for on the top section is the student's name, social security number, school name, dates of instruction and the instructor's name. More than one blank space is provided so that both the secondary and the post-secondary schools may use

the same record.

The bottom portion of the record must be used in conjunction with the Task Detailing document so that coded tasks (or units) may be interpreted. Again, two blanks are provided to rate the student on the accomplishment of the stated task. The first blank is provided for the secondary instructor to keep track of the student's accomplishments. It is not mandatory for the post-secondary instructor to fill in the second blank when a task is completed, but it is recommended. A record with notations by both the secondary and the post-secondary institutions would be a very valuable document when the student begins to look for employment. The potential employer, with the Task Detailing document, can determine exactly what students should know and how well they know it.

The Student Performance Record must be kept current. Some tools are needed to accomplish this important task. The first tool is the Individual Progress Chart such as the one in Figure 5. This chart should be made available to all students so they may check on their progress. In addition, the chart may be used as a work sheet to prepare a notation for an entry on the record. The second tool, already utilized by most programs, is the group progress chart (Figure 6). This chart will serve as a reminder to the instructor to keep notations current. The third tool, which is probably universal in its use, is the standard class roll book. Most class roll books have spaces where task rating notations may be entered.

In summary, the answer to the question, "When should notations be made?", is "daily." Record keeping will be no more than a routine task if performed daily, but becomes a burdensome task if too much time is allowed to transpire between the times that the record is brought up-to-date.

The record should be maintained by the person closest to the students,

[illegible]

Figure 5. Individual Progress Chart

HEALTH OCCUPATIONS SKILLS	
Name	
JOHN DOE	H.O.S. 1801
MARY DOE	H.O.S. 1802
etc.	H.O.S. 1803
	H.O.S. 1804
	H.O.S. 1901
	H.O.S. 1902
	H.O.S. 2001
	H.O.S. 2002
	etc.

Figure 6. Group Progress Chart

the instructor, and be kept in a secure place controlled by the instructor. When the student completes the program, or for any reason leaves the program, the record should be forwarded to the person responsible for keeping permanent records in the school. This will assure that the record will be available for forwarding, together with the grade transcripts, to receiving schools or employers.

The above suggestion does not preclude the instructor from keeping an additional permanent record (Student Performance Record) in his or her possession. This could be a useful practice in cases where the instructor needs a quick reference, or where an evaluation might be necessary.

The Student Performance Record, by its very nature, must be a carefully controlled document. It should be looked upon in the same light as the permanent record file in the counselor's or principal's office. In fact, if possible, the record should become part of that file. The performance record will, like a student's regular permanent record, have right-to-privacy stipulations. The record should not be released, just as a transcript of grades would not be, without the student's permission.

Supplementing the Record

Ideally, the performance record will always work; but, in order to protect the student and the integrity of the program, the contingency plan is necessary. The contingency plan suggested is a testing program which may be utilized when it becomes obvious the record is not working.

If students are coming from feeder school X with Performance Records that state they have satisfactorily completed tasks one through twenty-five, then those students should be able to perform as is indicated on the record. However, if the student cannot perform as indicated, the receiving school should not immediately become alarmed and blame the feeder school.

It should not have happened; but, it is possible that the student may have "slipped by." Only when this happens repeatedly should the receiving school become alarmed. At this point, the receiving school should be forewarned to be on the lookout for records from that program in school X. Also, the problem should eventually get back (one hopes through proper channels) to the instructor who completed the Record in the first place. However, until the problem is solved, the contingency plan (testing) will serve as a most adequate tool in awarding advanced credit.

Other cases in which a Record might be questioned are when a student applies for admission to the post-secondary school but has been out of high school for a year or more. The consensus of many vocational educators in Georgia is that the record alone is unacceptable for advanced placement if it is more than one year old; however, there may be exceptions.

One exception might be a student who has been out of school for more than one year, but has worked during that year in the field for which training was received. In this case, the student may be even more advanced than when she or he graduated from the high school program. The receiving school would then be justified in granting advanced placement to this individual based on the Performance Record and work experience.

Another example is a record which has been improperly filled out. For instance, a record which has a check mark (✓) rather than a rating might present problems in interpretation. The receiving school has several alternatives and must decide which path to follow. The post-secondary school can assume mastery on all tasks (units) checked and can grant advanced placement on that basis, or the post-secondary school may contact the secondary school to determine exactly what the check marks mean. A third alternative would be to require an examination.

Problems which may arise in the use of the Student Performance Record should not be overlooked. A solution must be found to prevent ill feelings from developing between sending or receiving institutions, teachers, or teachers and administrators. Careful advanced planning will be a major factor in avoiding problems.

Most post-secondary vocational-technical schools in Georgia operate on an area service basis. For example, one post-secondary area vocational-technical school (PSAVTS) in a rural area may serve 14 counties containing 17 comprehensive high schools (CHS). In an urban setting, a PSAVTS may serve only five counties, but they could contain over 20 CHSs. In either case, the same principle of establishing a working relationship between schools exists.

The record of the student's skills and knowledge should have the capacity to go beyond articulating the course work in a comprehensive high school cluster with only one post-secondary skill area. The Student Performance Record maintained by the high school teacher may be used to provide skill information to the single skill post-secondary teachers or other interested individuals from all of the specific areas taught within a cluster. For example, a health occupations teacher in a comprehensive high school should be able to certify with a single competency record a student's acquired knowledge and skill toward becoming a dental assistant, dental lab technician, radiologic technology aide, respiratory therapy assistant, emergency medical technician, medical assistant, operating room technician, physical therapy assistant and practical nurse.

The student performance record used should reflect the core competencies which will transfer into any of the listed areas. In accomplishing this, the competency record will be based on the breadth of the high school

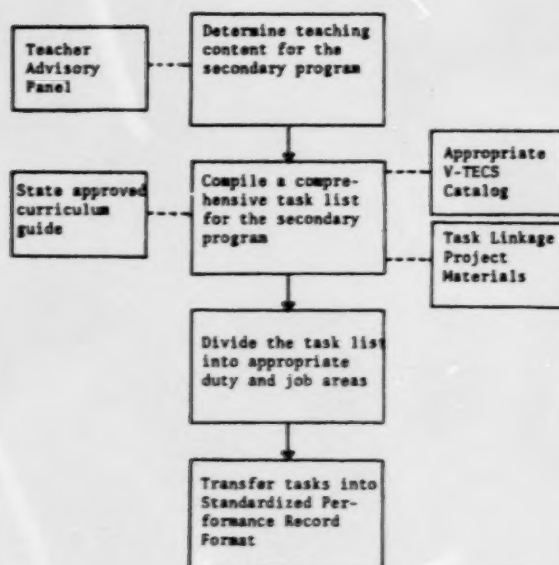


Figure 7. Developing a Student Performance Record

cluster program and the depth of the post secondary program.

There are four basic steps in the development of a Student's Performance Record (See Figure 7):

1. Determining the cluster's teaching content
2. Compilation of a task list for the cluster program
3. Identification of duties and job areas within the cluster area
4. Transfer of the tasks into a standardized performance record format.

In step one, the determination of the cluster's teaching content can be made by two different methods. The most expedient would be to use the curriculum guides being developed for use in Georgia. These guides contain both a task listing sequenced by D.O.T. code and a course outline by phase/block which, when properly developed, should be the principal resource for the performance record.

A second method for determining the teaching content of a cluster program will be to go to the teachers. They can provide information concerning both the task listing for the course and the course content which reflects

the tasks. The determination of a task list and the course content is an absolute necessity in order to describe accurately on the student's performance record what skills and knowledge are taught in the cluster and are possessed by the student.

All learning tasks may be classified as either manipulative, informational or attitudinal. The nature and level of the student performance record will determine if one, two, or all three of these task classifications are included.

Carl R. Bartel, in Instructional Analysis and Materials Development, outlines the following criteria for reviewing content items for purpose of identifying possible learning tasks:

1. Must be either manipulative, informational, or attitudinal.
2. Is self-contained, independent of others, and is used or performed essentially the same regardless of the assignment or activity in which it is included.
3. It occupies a significant place in the career ladder development process.
4. Has a definite beginning or starting point and an ending or completion point.
5. It must be ratable.
6. It contains learning content which is beyond merely a step in the procedure in performing a skill or obtaining knowledge.
7. Can be identified as a task by individuals who have competencies in the selected areas.
8. Must include two or more steps to be performed to complete the task.
9. Is of such length that one or two usually make up a single lesson or session.

This process of determining the tasks to place on the student's performance record can be augmented by other readily available documents. First, the V-TECS catalogs from appropriate areas can be used to add preciseness to the tasks listed on the performance record. These tasks, however, are based upon psychomotor operations and will not directly reflect some cognitive and affective skills. Second, the recent Task Linkage Project, conducted by Georgia State University, should prove to be an excellent source of information in determining the tasks to be included on the Student's Performance Record.

The curriculum structure reflected by the student performance record will illustrate the flexibility of the totally articulated curriculum in terms of appropriate job exit points. Although the flow design illustrated by the Student Performance Record would seem to indicate a lock-step curriculum, this is not the case. A student may vary considerably from the lock-step flow of events and into a curriculum which will reflect his or her individual needs.

When the task list is approved and the course content is matched to it, a division into appropriate duty and job areas must be made. This process will group the related tasks, which constitute a standardized part of a whole job, into duty areas. These duties can be based on worker responsibility, unique use of equipment or machinery, and specific system designs.

The student performance record will permit the grouping of individual tasks into duty areas, then into job or occupational categories. When possible, these categories of tasks may be aligned with D.O.T. occupations and exit points. Figure 8 gives an illustration of the mass of required tasks in an articulated high school and post secondary program. It shows the estimated ceiling of tasks taught on the secondary and also the post

A CYLINDER OF OCCUPATIONAL TASKS IN AN ARTICULATED VOCATIONAL PROGRAM

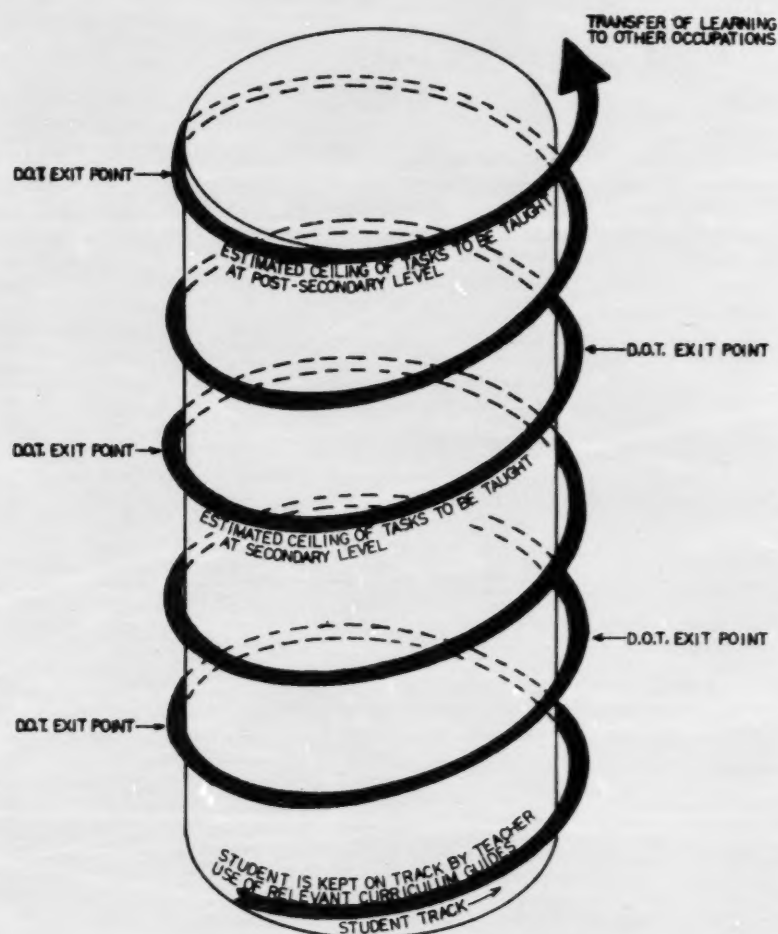


Figure 8

secondary level. In addition, it shows how students, after completing certain tasks, can spin off at a D.O.T. Exit Point.

The last step in the standardized process for establishing a student's ability record is the transfer of the task statements to the student performance record format. The record kept as part of the student's permanent file should be a single or double sheet, printed front and back, depending upon the number of tasks being reported. This record should list the general duty areas in the job and code the tasks numerically. This type of procedure will require a means for expanding the abbreviated record into

a more detailed comprehensive document (Task Detailing) which identifies the skills the student possesses.

A Student Performance Record such as the one suggested here has been approved and accepted by many vocational educators from around Georgia. In its abbreviated format, the Student Performance Record will prove to be an easy document for the high school instructor to keep up with and will allow the instructor to give the student a rating for each task listed under a duty area. The Task Detailing document will give employers, teachers, counselors, students and parents detailed information about what each student can and cannot do.

In summary, the student performance record may operate like an accordion. The actual performance record will be a single or double sheet document which is easy to maintain in its compact state. However, for the performance record to truly "make music," it will easily expand like the bellows on an accordion through the use of an accompanying task detailing document which provides expanded breakdown of what the student's abilities are.

In its single sheet form, the performance record will be easily stored, maintained, and transferred from the high school to the post secondary school. This procedure will necessitate, however, that the Task Detailing document be made available to all potential users of the performance record. All Georgia schools should have these expanded documents on file; therefore, only industry, business, and parents would find it necessary to request the document. This has been viewed by many Georgia vocational educators as an opportunity for public relations improvement within the community: that is, through this means the schools will have an excellent means of providing local business and industry with specific information about what is being taught in each vocational program.

STRUCTURED INTERVIEW

For the purposes of the Student Assessment System, a structured interview has been defined as follows: An oral examination of a student's ability administered by the instructor and developed from content that has been previously identified and delimited.

If a student seeking advanced placement in a Georgia post secondary vocational school has a performance record which lacks credibility for some reason, a structured interview may be scheduled. This interview, however, must be designed to supplement an existing performance record or other documentation rather than to take the place of it.

The interview should be conducted by an instructor from the department for which the student has applied. In conducting this interview, the instructor should use a standardized device which will insure some degree of objectivity.

The interview should be built around a document such as the performance section of the Domain Referenced Test. By using the performance section of this document as a guide, the instructor may randomly select a topic for discussion during the interview. In order to know which domain(s) to select from, the instructor must have the student's performance record. Using it, the instructor can determine the domain(s) the student claims to have competency in.

As an example, consider a student who has graduated from a comprehensive high school's transportation program. Upon graduation, the student was employed at a local service station and worked there for 18 months prior to applying for admission at the local PSAVTS. The student's performance record indicates that one of the areas of instruction was brakes and that the student has an acceptable or high level of skill in that area.

Perhaps the local policy states that a student's record cannot be accepted at face value if training was received over one year prior to the application at the post secondary school. The admissions committee may decide, in this case, that since the student had been working in the field for which training was received, the written and performance test may not be necessary. A decision is made that, in lieu of an examination, a structured interview may be all that is needed to determine whether the student has the ability which would warrant advanced placement. When such a decision is made the admissions committee designates an interviewer and furnishes that person with the Student Performance Record. The interviewer should be an instructor from the vocational program the student wishes to enter.

Developing A Structured Interview

A structured interview is relatively easy to develop. Careful planning is required to develop a good interview; therefore, do not let the ease of its development lull you into careless planning. Using just any question or group of questions will not suffice. The questions to be asked must be carefully thought out if the interview is to be useful to the interviewer and fair to the student being interviewed.

The following narrative will outline the procedures for developing a good interview and provide information on the selection of content. However, the actual content from which the questions should be developed is outlined in the section on Domain Referenced Testing.

The first step in the development of the interview is to determine from the Student Performance Record or other documentation the skill and/or knowledge the student should possess. Next, randomly select two or three tasks from the domain or domains in which the student is to be tested (see

the section on developing Domain Referenced Tests). Develop two or three questions related to each task selected. As the student responds to the initial questions, other related questions may be raised because of incomplete or unsatisfactory answers.

It is important that the interviewer makes sure the student has provided all of the information he/she has relative to the initial question(s). Many times the person being questioned will respond with short answers which do not clearly indicate that person's level of knowledge on the subject. It is the responsibility of the interviewer to rephrase the question or ask additional questions that will lead the student to provide additional details.

Some types of questions which might be asked are:

1. Practical Nursing: Describe how you would transfer a weak, but ambulatory, patient from a bed to a wheelchair.
2. Automotive Mechanics: List two or three malfunctions which might cause a liquid-cooled engine to overheat and describe how they can be corrected.
3. Cosmetology: What type of shampoo should be used on a patron with a permanent hair coloring? Natural hair color is gray.

DOMAIN REFERENCED TESTS

Background and Significance of DRT

Articulation in vocational education is an effort to allow the students who are entering a vocational post secondary school to bypass those skill areas in which they are already competent. This competency may have been acquired in high school, industry or the military. When creditable evidence is available to document a student's ability to perform specific skills, providing advanced placement should not present a problem. However, when documentation is questionable, incomplete, or out-of-date, a means of providing supporting evidence that the skills are viable is called for. A comprehensive test of the student's skills would provide the necessary evidence; however, this procedure is cumbersome and time consuming.

There is a procedure, introduced by Hively (1974) and aptly called Domain Referenced Testing (DRT), which provides a means of determining a student's skill level without the time and effort required for comprehensive testing.

DRT is a procedure designed to determine, with a great degree of accuracy, where to place a student within a training cycle. It provides a method for the stratified random sampling of items from a universe (domain) of test items and can be used to develop either cognitive or psychomotor test items. A competent (saturation) level of learning in a specified domain is required in order for a student to exclude specific training from a course of study. The areas of competence can be clearly shown through the use of a DRT instrument.

Without using the term, Domain Referenced Test, Osburn (1968) describes the idea very clearly by stating . . . "a test constructed and administered in such a way that an examinee's score on the test provides an unbiased estimate of his score on some explicitly defined universe of item content." Also, Gronlund, (1973), in discussing Criterion Referenced Tests (CRTs), stated: "If a representative sample of such behaviors is obtained for the test . . . , we can then generalize from test performance to the larger domain of learning tasks that the test represents."

Two general requirements for test construction are implied in the above quotations. First, all items that could possibly appear in the test must be specified in advance. Second, the items in a particular test must be selected by random sampling or stratified random sampling from the universe of content.

This description of a DRT differs from both Norm Referenced Testing (NRT) and Criterion Referenced Testing (CRT). Discussing NRTs, Hively (1974) describes the difference between NRT and DRT as being the method of selecting items to be included in the test and interpreting scores. Where NRT uses its data for prediction and selection, DRT collects data for determining competency improvement and transfer of learning.

The distinctions between DRT and CRT are not as pronounced. A CRT measures specific competencies, identifies those who have not mastered an objective, identifies the areas of non-mastery and assists in instructional design. CRT appears to assume that a transfer of learning exists (Evans, 1975; Popham, 1973; Mager, 1973). The primary difference is that in a DRT an extensive pool of test items exists which represents the basic characteristics of important parts of the universe of knowledge. DRT uses these items randomly to measure transfer of learning by observing the methods and results that a student conveys while being tested. Transfer

of learning is an important part of vocational education. Instructor product bias, availability, and high costs have in many instances led to the student being taught psychomotor and cognitive skills using one brand, make or model of training aids and devices.

It is not the intent of the writers to replace CRTs with DRTs. Criterion referenced testing should be used throughout the training program to evaluate the performance objectives, whereas domain referenced testing is used to measure the extent of transferable skills, whether or not skills learned are useful, and to achieve curriculum articulation from one institution to another. A domain evaluation requires the teacher to focus on transferable, generalized skills and knowledge rather than rote learning. It does this by measuring a stratified random sample from a universe of knowledge rather than the criteria of a specific objective.

A further distinction between DRT and CRT can be made through their use in achieving the following articulation objectives outlined by Allen, Fowler, and Venn (1979).

1. Establish a system whereby students may move from one level of instruction to another and retain credit for skills already developed.
2. Provide the student maximum information and assistance in making the transition from school to school or program to program.
3. Utilize a curriculum which is relevant to student training objectives as specified by business and industrial needs and standards.
4. Provide a systematic approach to instruction which progresses sequentially through various levels of the educational system and leads to a number of differentiated employment competencies.

5. Develop a methodology for continuous evaluation and modification necessary for student progress and system efficiency which utilize both process measures and product measures.

A DRT would be used in objective one to measure the transfer of learning that has taken place and to determine if a student could bypass certain occupational training in the post secondary school.

In objective five a CRT would be used to evaluate the student's progress through both secondary and post secondary courses. It will determine if the specific objective criteria are being met (formative) and if the course goals and objectives have been realized (summative) at the end of the course.

West and others (1979) have contributed significantly to domain referenced testing in Vocational Education. One of their concerns is whether all students should start at the same level of learning. If all students are not at the same level, how can they be placed in a program that would put them just beyond their mastery level? It was determined that norm referenced testing cannot be used in evaluating individual competencies. Placing students in rank order or in some relationship with their peers is not sufficient. Also, criterion referenced testing cannot be an effective measuring device because it is too narrowly conceived and will not measure transfer of learning. West (1979) lists four reasons for developing DRT's:

1. Assist the instructor in deciding, with a great degree of accuracy, where to place a student in a training cycle.
2. Predict student success in the performance of a group or domain of related tasks.

3. Allow the instructor to develop additional DRTs by using the same test format but changing the test data by manipulating task variables.
4. Measure the learner's mastery of a domain of tasks to industry standards. (pp. 2-3)

It has been noted that norm referenced testing and criterion referenced testing cannot link mastery learning with transfer of knowledge. To fill this void, a clear theory of measurement and the research and development of domain referenced testing in Vocational Education is proposed. The main idea behind DRT is to assess a student's knowledge and to place that student at a point in a program which is equivalent to the student's mastery level. This would have a three-fold positive effect. (1) The student would be processed through the course and enter the labor market in a minimal amount of time; (2) DRTs would provide an optimum basis for developing an individualized education plan (IEP) for the post secondary handicapped; and (3) it would allow a greater number of students, per year, to participate in post secondary education.

Developing A Domain Referenced Test (DRT)

In the following narrative a step by step procedure for developing a Domain Referenced Test (DRT) is presented and examples are given for each step. Following the description and examples a more detailed task analysis process is presented for three different occupational areas, based on the ways tasks may be related. Generally, tasks may be related in one of the following ways.

1. Tasks that are related to the maintenance and/or repair of a system or subsystem. (i.e. Automotive Mechanics. System: Heating and Cooling)

2. Tasks that are related to the production or a product or group of related products. (i.e. Typist. Products: business letters, form letters, memoranda, etc.)
3. Tasks that are related to the performance of a service. (i.e. Practical Nursing. Service: infant care, basic patient care)

General Procedure: Task Analysis

The first step in the development of DRTs is the identification of the domains and the determination of the tasks that should be included in each domain. This is a simple process of forming tentative groups of tasks which are related or appear to be related based on the best judgement of the developer. However, each occupational area presents its own special problems in the identification of tasks which may be included in a domain.

EXAMPLE I: Tentative grouping of tasks to form the Infant Care Domain for Practical Nursing (Based on tasks that are related to the performance of a service.)

Tasks

1. Carry an infant
2. Weigh and measure an infant
3. Collect a urine specimen
4. Give daily care to a newborn
5. Feed an infant

When the tasks have been placed in tentative groups to form a domain, the next step is to analyze the tasks to determine their specific relationship. During the analysis process some tasks may be removed from the domain and others may be added. Also, new domains may be formed as the commonalities among tasks begin to become apparent. To aid in determining the relationships and identifying the task commonalities, each task is analyzed to identify the significant elements or components of the task. To insure that the analysis is complete, several people familiar with the occupational areas should be involved in the analysis process. It is important that all elements of the task be identified.

EXAMPLE II: Identifying the elements in the Infant Care Domain,
Practical Nursing.

Tasks and Elements:

1. Carry an infant
Elements: Cradle hold
Football hold
Shoulder hold
2. Weigh and measure infant
Elements: Weigh
Measure
3. Collect urine specimen
Elements: Male
Female
Routine specimen
Clean catch specimen
4. Perform daily care of newborn
Elements: Bath
Take temperature
5. Feed infant
Elements: No significant elements

Following the identification of the elements of each task in the domain, the elements are grouped with the related elements of other tasks within the domain. At this point, there should be several groups of elements with each group representing a facet of the domain. A facet is identified as "a characteristic on which domain test items may differ." Elements are variable components (alternatives) of the facets used to form test items. Each facet group of elements, grouped according to their commonalities, is given an identifying title. The facet title should consist of one or two words that are descriptive of the elements within each facet.

EXAMPLE III: Grouping the elements into facets of the Infant Care Domain for Practical Nursing.

Facet: A. Carry
Elements: 1. Cradle hold
2. Football hold
3. Shoulder hold

Facet: B. Sex
Elements: 1. Male
2. Female

Facet: C. Urine Specimen
 Elements: 1. Routine
 2. Clean catch

Facet: D. Nursing Care
 Elements: 1. Daily care
 2. Weigh
 3. Measure
 4. Take temp.
 5. Feed

At this point, all of the related tasks should be grouped in a domain, and the elements of each task should be identified, grouped into facets and titled according to their commonalities. The facets and elements of a domain make up the Content Limits for the domain. Content Limits has been defined as, "The boundaries of a domain that identify the allowable content of a DRT." In essence the allowable content of a DRT is identified and listed in the Content Limits.

EXAMPLE IV: Grouping the facets and elements to form the Content Limits for the Infant Care Domain for Practical Nursing.

CONTENT LIMITS

(A) Carry

1. cradle hold
2. football hold
3. shoulder hold

(B) Sex

1. male
2. female

(C) Urine Specimen

1. routine
2. clean catch

(D) Nursing Care

1. daily care
2. weigh
3. measure
4. take temp.
5. feed

The next step is to develop an Item Form Sheet for each domain in the occupational area. The Item Form Sheet is a list of rules for generating a set of related test items. It includes (1) a domain statement that identifies the behavior and the content upon which the test may focus, (2) the instructions for forming a test item, and (3) the Content Limits that identify the allowable content of the DRT.

EXAMPLE V: Item Form Sheet

DOMAIN XIV: INFANT CARE

Item Form Sheet

Domain Statement: Providing daily care for an infant.

Instructions:

1. Randomly select an element from each facet in the content limits to form a test situation.
2. Eliminate any conflicting elements from the test situation. Another element may be selected from the same facet provided it does not create another conflict.
3. Carefully review all of the elements included in the test situation to be sure it represents a realistic situation. Make any needed adjustments.
4. Write a test item which includes the elements selected and clearly defines the test situation.
5. Be sure all necessary equipment, materials, and instructions (such as physician's orders) are readily available to the student.
6. Select the correct HOS checklists to evaluate the student's performance. Give the student written instructions which designate the skills he/she is to perform.
7. Evaluate the student's performance.

NOTE: Be sure to also assess the student(s) to determine their knowledge of nursing theory related to Domain XIV.

CONTENT LIMITS(A) Carry

1. cradle hold
2. football hold
3. shoulder hold

(B) Sex

1. male
2. female

(C) Urine Specimen

1. routine
2. clean catch

(D) Nursing Care

1. daily care
2. weigh
3. measure
4. take temp.
5. feed

Task Analysis Process: Three Examples

The task analysis procedure, described in the preceding narration, is generally based on the purpose of each task. The following are examples of the analysis process used to analyze the tasks and to identify the facets and

elements of each domain in three different occupational areas. Most vocational occupations can be quite adequately analyzed by using the process outlined in one of the examples provided. A Content Limits section, which identifies the facets and elements of the domain, is provided in each example.

Each of the following examples illustrates the analysis of only one task. However, each task in a domain must be analyzed before the elements are grouped into facets and listed in the Content Limits. The Content Limits in each of the three occupational areas covered in the examples are the results of an analysis of all the tasks in each domain.

EXAMPLE VI: Automotive Mechanics

Basis for determining the domain tasks: Tasks that are related to the maintenance and/or repair of a system or subsystem of the occupational area.

System (Domain): Heating and Cooling

Domain Tasks:

1. Inspect, adjust, and/or replace fan belts
2. Remove and replace radiators
3. Replace radiator hoses
4. Replace water pump
5. Test and replace thermostat
6. Solder minor leaks in radiator

(Task list is not complete)

Task: Replace water pump

Purpose of Task: Maintain/repair cooling system

Analysis:

1. List part or parts to be serviced,
repaired or replaced
 2. List the component parts of the system
potentially involved in the service,
repair, or replacement of the part
listed in step 1
- | |
|-----------------|
| water pump |
| fan belt |
| fan |
| fan shroud |
| hoses |
| radiator |
| air conditioner |
| compressor |
| coolant |

- | | |
|--|---|
| 3. List the possible malfunctions of the part listed in step 1 | defective bearing
leaking |
| 4. List the different makes, models, or types of machinery or equipment which the task may relate to | all liquid-cooled
automobile engines |
| 5. Basic knowledge and/or skill needed to perform this task | cooling system
use of hand tools
related safety measures
diagnostic procedures |

CONTENT LIMITS

- | | |
|---|--|
| (A) <u>Pump</u>
1. leak
2. defective bearing | (B) <u>Belt</u>
1. deteriorated
2. broken
3. loose |
| (C) <u>Hoses</u>
1. loose connection
2. deteriorated
3. punctured or leaking | (D) <u>Coolant</u>
1. low content
2. high freezing point |
| (E) <u>Radiator</u>
1. plugged
2. punctured or leaking | (F) <u>Cap</u>
1. bad seal
2. weak spring
3. improper pressure |
| (G) <u>Heater</u>
1. pulgged
2. leaking | (H) <u>Heater Control</u>
1. vacuum motor stuck
2. cable broken
3. vacuum lines loose |
| (I) <u>Fan</u>
1. out of balance
2. faulty clutch
3. loose | (J) <u>Thermostat</u>
1. open
2. closed
3. wrong heat range
4. installed wrong |
| (K) <u>Malfunctioning Warning System</u>
1. sending unit bad
2. dash unit bad | (L) <u>Over-Flow Tank</u>
1. leaking
2. loose |

The content limits illustrated above are the results of an analysis of all the tasks in the Heating and Cooling Domain of Automotive Mechanics. In this case the parts of the system are the facets and the malfunctions of each part are listed as the elements.

EXAMPLE VII: Typist

Basis for determining the domain tasks: Tasks that are related to the production of a product or a group of related products.

Products(s) (Domains): Business letters, Manuscripts, Memoranda, etc.

Domain Tasks:

1. Type a business letter
2. Type a manuscript
3. Type a memorandum
4. Type minutes of a meeting
5. Type an agenda

(Task list is not complete)

Task: Type a business letter.

Purpose of Task: Produce a product, specifically, a business letter.

Analysis:

- | | |
|--|---|
| 1. List the product(s) to be produced | business letter |
| 2. List the factors that would make a difference in the way this product is produced | letter style
stationery size
number of pages
special features
number of copies |
| 3. List any different types of tools, equipment, or supplies which may be used to produce the product(s) | electric typewriter
manual typewriter
automated typewriter
stationery
correction supplies |
| 4. Basic knowledge and/or skill needed to perform this task | typing skill
punctuation
letter styles
spelling
proofreading
correcting errors
reproduction |

CONTENT LIMITS*

- | | |
|---|---|
| <p>(A) <u>Item</u></p> <ol style="list-style-type: none"> 1. agenda 2. business letter 3. statistical report 4. itinerary 5. manuscript 6. memorandum | <p>(B) <u>Style</u></p> <ol style="list-style-type: none"> 1. block 2. modified block 3. A.M.S. 4. style manuals
(specify) |
| <p>(C) <u>Punctuation</u></p> <ol style="list-style-type: none"> 1. open 2. mixed | <p>(D) <u>Stationery Size</u></p> <ol style="list-style-type: none"> 1. executive size 2. 8½ x 11 3. 8½ x 14 4. 1/2 sheet (memo) |
| <p>(E) <u>Size</u></p> <ol style="list-style-type: none"> 1. one page 2. multiple page | <p>(F) <u>Reproduction</u></p> <ol style="list-style-type: none"> 1. stencil process (m. meo) 2. spirit process 3. carbon 4. xerox 5. offset |
| <p>(G) <u>Error Correcting</u></p> <ol style="list-style-type: none"> 1. liquid process 2. tape process 3. eraser 4. stencil correcting fluid | <p>(H) <u>Other</u></p> <ol style="list-style-type: none"> 1. special features 2. format (agenda,
itinerary, statistical report) |
| <p>(I) <u>Input</u></p> <ol style="list-style-type: none"> 1. script rough draft 2. typed rough draft 3. concise notes 4. unorganized | |

*Adapted from: West, Bill, et al., Domain Referenced Test (DRT) For The Production Typewriting Domain. Indianapolis: Indiana Curriculum Materials Center, State Board of Vocational and Technical Education.

The content limits above are the result of an analysis of all the tasks in the Typist Domain. In this case the products are listed as elements as well as the items and information listed in Steps 2, 3, and 4 of the analysis. The elements are grouped in facets and titled according to their commonalities.

EXAMPLE VIII: Licensed Practical Nurse

Basis for determining the domain tasks: Tasks that are related to the performance of a service.

Service: Basic Patient Care

- Tasks:
1. Assist the patient to maintain oral hygiene
 2. Give bed bath
 3. Care for nails
 4. Make an occupied bed
 5. Take patient's temperature
 6. Assist to dangle and ambulate
(Task list is not complete)

Task: Assist to dangle and ambulate

Purpose of Task: Assist a patient to ambulate

Analysis:

- | | |
|--|---|
| 1. List the service(s) to be provided | ambulation |
| 2. List the ways the service(s) may be performed | nurse assistance
without assistance
with assistive devices |
| 3. List the factors that will make a difference in the way a service would or could be performed | condition of patient
(list major conditions)
age of patient
(identify age groups)
sex of the patient |
| 4. List any equipment and/or supplies necessary to the performance of the service | assistive devices
(based on age and conditions of patient) |
| 5. Basic knowledge and/or skills needed to perform this task | patient conditions
and effect on ambulation
transcribe physician's orders
record nursing care
knowledge of the general plan of the body and structural units
the purpose of dangling |

CONTENT LIMITS

- | | |
|--|--|
| <p>(A) <u>Patient Condition</u> (May use more than one)</p> <ol style="list-style-type: none"> 1. bedfast 2. unconscious (non-responsive) 3. ambulatory 4. blind 5. receiving IV 6. limb in cast (specify limb) 7. absence of limb 8. paralyzed (identify specific condition) 9. diabetic | <p>(B) <u>Sex</u></p> <ol style="list-style-type: none"> 1. male 2. female |
| <p>(C) <u>Age Group</u></p> <ol style="list-style-type: none"> 1. adult 2. geriatric 3. pediatric | <p>(D) <u>Ambulation</u></p> <ol style="list-style-type: none"> 1. with assistive devices 2. with assistance 3. without assistance |
| <p>(E) <u>Oral Hygiene</u></p> <ol style="list-style-type: none"> 1. with dentures 2. without dentures | <p>(F) <u>Elimination</u></p> <ol style="list-style-type: none"> 1. bed pan 2. urinal 3. bedside commode |
| <p>(G) <u>Bathing</u></p> <ol style="list-style-type: none"> 1. bed bath 2. shower 3. tub bath 4. backrub 5. tepid | <p>(H) <u>Grooming</u> (May use up to two)</p> <ol style="list-style-type: none"> 1. brush/comb hair 2. care for nails 3. shave 4. shampoo <ol style="list-style-type: none"> a. wet b. dry |
| <p>(I) <u>Making Beds</u></p> <ol style="list-style-type: none"> 1. occupied 2. unoccupied | <p>(J) <u>Bed Position</u></p> <ol style="list-style-type: none"> 1. high horizontal 2. low horizontal 3. trendelenburg 4. reverse trendelenburg 5. semi-fowlers 6. fowlers |

(K) Vital Signs

1. temperature
2. pulse and respiration
3. blood pressure

(L) Treatment

1. tepid bath
2. medicated bath
3. apply ointment
4. apply antiembolic stocking
5. use alternating pressure mattress

(M) Physician's orders and recording nursing care may be made a part of any domain by the way the test item is written.

The content limits illustrated above are the results of an analysis of all the tasks in the Basic Patient Care Domain for Practical Nursing. In this case general factors which would make a difference in the way the service could be performed and the general services to be provided are identified as facets. The specific factors and specific services are identified as elements.

Developing A Test Item

When the domains have been formed and the Item Form Sheet is complete a test item may be developed. Following is an example of the development of a test item using the Basic Patient Care Domain for Practical Nursing. The Item Form Sheet is presented followed by a step by step development of a test item.

EXAMPLE IX: Developing a Test Item using the Item Form Sheet

DOMAIN I: BASIC PATIENT CARE (SKIN CARE)

Item Form Sheet

Domain Statement: Performing basic patient care skills (Give care to a patient with an integumentary problem)

Instructions:

1. Randomly select an element from each facet in the content limits to form a test situation.
2. Eliminate any conflicting elements from the test situation. Another element may be selected from the same facet provided it does not create another conflict.

3. Carefully review all of the elements included in the test situation to be sure it represents a realistic situation. Make any needed adjustments.
4. Write a test item which includes the elements selected and clearly defines the test situation.
5. Be sure all necessary equipment, materials, and instructions (such as physician's orders) are readily available to the student.
6. Select the correct HOS checklists to evaluate the student's performance. Give the student written instructions which designate the skills he/she is to perform.
7. Evaluate the student's performance.

NOTE: Be sure to also assess the student(s) to determine his/her knowledge of nursing theory related to Domain I.

CONTENT LIMITS

- | | |
|--|--|
| <p>(A) <u>Patient Condition</u> (May use more than one)</p> <ol style="list-style-type: none"> 1. bedfast 2. unconscious (non-responsive) 3. ambulatory 4. blind 5. receiving IV 6. limb in cast (specify limb) 7. absence of limb 8. paralyzed (identify specific condition) 9. diabetic | <p>(B) <u>Sex</u></p> <ol style="list-style-type: none"> 1. male 2. female |
| <p>(C) <u>Age Group</u></p> <ol style="list-style-type: none"> 1. adult 2. geriatric 3. pediatric | <p>(D) <u>Ambulation</u></p> <ol style="list-style-type: none"> 1. with assistive devices 2. with assistance 3. without assistance |
| <p>(E) <u>Oral Hygiene</u></p> <ol style="list-style-type: none"> 1. with dentures 2. without dentures | <p>(F) <u>Elimination</u></p> <ol style="list-style-type: none"> 1. bed pan 2. urinal 3. bedside commode |
| <p>(G) <u>Bathing</u></p> <ol style="list-style-type: none"> 1. bed bath 2. shower 3. tub bath 4. backrub 5. tepid | <p>(H) <u>Grooming</u> (May use up to two)</p> <ol style="list-style-type: none"> 1. brush/comb hair 2. care for nails 3. shave 4. shampoo <ol style="list-style-type: none"> a. wet b. dry |

(I) Making Beds

1. occupied
2. unoccupied

(J) Bed Position

1. high horizontal
2. low horizontal
3. trendelenburg
4. reverse trendelenburg
5. semi-Fowlers
6. Fowlers

(K) Vital Signs

1. temperature
2. pulse and respiration
3. blood pressure

(L) Treatment

1. tepid bath
2. medicated bath
3. apply ointment
4. apply antiembolic stocking
5. use alternating pressure mattress

(M) Physician's orders and recording nursing care may be made a part of any domain by the way the test item is written.

Step 1. Randomly select an element from each facet in the domain.

Elements selected: A.1; B.1; C.1; D.3; E.1; F. 4; G.1; H.3; I.2; J.6; K.2; M. L was not sampled because it relates to skin conditions which are not being tested at this time. M is optional.

Step 2. Eliminate any conflicting elements from the test situation. Another element may be selected from the same facet.

Elements eliminated and/or replaced: Facet D was eliminated because a A.1 is bedfast. F.4 was replaced with F.1 because the patient is bedfast. I.2 was replaced with I.1 because the patient is bedfast.

Step 3. Carefully review all of the elements selected to be sure a realistic situation is represented.

Elements: bedfast, male, adult, with dentures, bedpan, bed bath, shave, occupied bed, fowlers, pulse and respiration.

Step 4. Write a test item which includes the elements selected and clearly defines the test situation.

Test item: Given a bedfast adult male patient who is receiving IV, transcribe and follow the physician's orders to provide the patient with the following care: elimination, bathing, grooming, oral hygiene, change bed linens, and leave the bed in the Fowler's position. Record the nursing care.

The remaining three steps are procedures that aid in the management and evaluation of the test.

Step 5. Be sure all necessary equipment, materials, and instructions (such as physician's orders) are readily available to the student.

Step 6. Select the correct HOS checklists to evaluate the student's performance. Give the student written instructions which designate the skills he/she is to perform.

Step 7. Evaluate the student's performance.

Summary

DRTs are developed through a careful analysis of each task. Each task must be assigned to a domain and all elements of each task must be identified and grouped into facets according to their commonalities. The facets should be identified with a descriptive title. Finally, instructions for developing a testing situation must be developed.

There is no easy way to develop a domain and perform the analysis necessary to provide the basis for DRTs. As was stated earlier in this section, "each occupational area presents its own special problems." Generally, one of the three analysis procedures presented will provide considerable assistance in the development of DRTs.

A thorough study of the DRTs developed through this project and the explanation provided in this publication combined with a thorough understanding of the occupational area for which DRTs are to be developed should provide the expertise necessary for the development of DRTs. Also, the careful and thorough analysis of the tasks cannot be over-emphasized.

EVALUATION

Each performance test should have a formal means of evaluation established. The performance test furnished as a part of the Student Assessment System developmental project uses a variety of these devices. They range from a general student/instructor checklist used with all identified domains in Automotive Mechanics, to a separate checklist and rating scale designed specifically for each separate domain in Cosmetology, to a complete volume of checklists used with the various testing situations in Practical Nursing.

A recommendation for instructors using evaluation devices for performance tests is a thorough review of the subjectivity/objectivity and appropriateness of the device. If they are not suitable to evaluate the test being given changes should be made or new devices created.

Any evaluation device developed for performance testing must have two primary qualities. First, it must be easy to use and accurate; second, it must help prevent instructor bias. Three such instruments are currently available and relatively easy to construct. These are the Scorecard, the Checklist and the Rating Scale. There are variations of each device.

The Checklist, Figure 1, is primarily used as a communication device between the instructor and the student. It can be used to evaluate both process and products. As a general rule the checklist should be used only on simple jobs that can be evaluated by visual inspection. They should not be used to evaluate jobs that could contain concealed errors, i.e., an engine overhaul.

Scorecards, Figure 2, are also useful in evaluating process and product. Develop the scorecard by selecting the items to be scored and

assigning a point value to each item. The point value can be derived from the tolerance allowed by the manufacturer, the critical nature of the task and in part from the percentage of instructional time used to teach a given item or step. Once a criterion has been determined, a standard score and a minimum acceptable score must be calculated for each criterion. It is important to note that the student must achieve at least the minimum score on each criterion. The total score is used as a grade only after all minimum scores have been met. If manufacturer's tolerances are numerical values, then that same numerical value can be used as a standard and minimum score. An example would be a value clearance specification of 0.013" to 0.017" or $0.015" \pm 0.002"$. The ideal clearance is exactly 0.015". On the scorecard the corresponding point value is 15. For each 0.001" the student misses the ideal clearance, one point is deducted from the standard score. If the student sets the clearance at 0.016" then the score is 14, if the clearance is 0.012" then the point value is 12 or an unacceptable score.

The Rating Scale, Figure 3, is used to evaluate a product or process performance using a scale. In developing the rating scale instrument, the process or product descriptors are arranged alongside a scale that in one of several forms will indicate the rating of the performance from poor to excellent. The rating scale also has a value as a device for measuring attitudes.

The sample evaluation devices shown have the added feature of a column that allows the student an opportunity for self-scoring. This helps the student focus on quality work and reduces the number of times the instructor will have to become involved with observing a given student in a specific performance.

CHECKLIST

Major Block
or Domain: _____

Objective or
Domain Description: _____

DIRECTIONS: Place an (X) in the column that best describes the quality of
your work. Ask the instructor to do the same.

	Student Check			Instructor Check		
	Poor	Average	Excellent	Poor	Average	Excellent

Student Signature _____

Instructor Signature _____

Figure 1

SCORECARD

Major Block
or Domain: _____

Objective or
Domain Description: _____

Directions: Score yourself from 1 to the highest possible score. Ask the instructor to do the same. You must achieve the minimum score for each criteria for successful mastery of the objective.

OBJECTIVE CRITERIA	Std. Score	Min. Score	My Score	Instructor's Score

Student Signature _____

Instructor Signature _____

Figure 2

RATING SCALE

Major Block or
Domain: _____

Objective or
Domain Description: _____

DIRECTIONS: Place the rating you select in the last column on the right under "My Score". If the rating falls between 1 and 2, it will be evaluated as poor, 3 and 4 will be average, and 5 will be excellent. Use a number for the rating.

1	2	3	4	5	MY SCORE	INSTRUCTOR'S SCORE
						

Student Signature _____

Instructor Signature _____

Figure 3

DEFINITION OF TERMS

This project includes, by necessity, certain terms peculiar to the subject under consideration. These terms are identified as follows.

Content Limits - The boundaries of a domain that identifies the allowable content of a Domain Referenced Test (DRT). Usually grouped into facets and elements of the facets. Identifies the allowable content of a DRT.

Competency - The ability (knowledge, skills and attitudes) to perform all of a group or cluster of related tasks required to complete a designated activity according to occupational standards. In the educational setting the statement of a competency includes expected student outcomes in terms of knowledge, skills, and attitudes required to complete a designated activity as defined by incumbent workers according to the standards of the work place.

Comprehensive Examination - An examination which includes test items for each element of knowledge and/or skill in a specified area to be tested.

Domain - A well-defined set or cluster of related tasks. Specific relationships are determined through an analysis of the tasks.

Domain Referenced Test (DRT) - A test developed from a stratified random selection of test elements.

Domain Statement (Description) - A general descriptive statement that identifies the behavior and the content upon which the test may focus.

Duty - A group of related tasks which constitute a standardized part of a whole job (worker responsibility, unique use of equipment or machinery and specific system designs).

Elements - Variable components (alternatives) of the facets used to form test items. One or more elements from separate facets may be combined to form a test item.

Facets - Characteristics on which domain test items may differ. Facets are made up of groups of related but variable components which are called elements.

Item Form Sheet - A list of rules for generating a set of related test items. (Hively, 1974). An Item Form Sheet includes the instruction or rules for forming a test item and the limits of the content of the test item.

Job - A specific area of specialization within an occupational field consisting of several closely related duties for which a person would expect to receive remuneration. Should be identified by DOT code.

Structured Interview - An oral examination of a student's ability administered by the instructor and developed from content that has been previously identified and delimited by domain.

Task - The smallest division of work in which a measurable output occurs.
A logical and necessary step in the performance of a duty.

Test Item - A statement of a situation or a question designed to evoke a specific response or set of responses. The responses may be verbal, written, psychomotor or a combination of response types.

Test Item Pool - A list or group of test items related to a specified area of knowledge and/or skill to be tested.

Waiver - The act of allowing students to bypass instructional units in which they have demonstrated previously acquired knowledge and/or skill.

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